

Environmental Science

LIMITS TO THE PRIMARY PRODUCTIVITY OF THE OHIO RIVER: NUTRIENT AND LIGHT LIMITATION EXPERIMENTS.

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The formation of algal blooms in larger rivers is regulated by the complex interplay of factors which influence water transparency, nutrient availability and the abundance of grazers. The relative importance of these factors on the primary productivity of the Ohio River was examined through manipulative experiments. Variable light levels (achieved by shading tanks) and nutrient concentrations (amendments of nitrogen, phosphorous and silica levels) were replicated in 2000 L outdoor tanks containing natural river water and phytoplankton communities. Response variables were measured at 12 hour intervals during the 6-day experiment and include estimates of algal biomass (as chlorophyll), productivity (from daytime oxygen production) and rates of nutrient depletion. From the data, a negative correlation existed between rates of chlorophyll production and nutrient depletion, as algae took up nutrients. Furthermore, tanks with higher light dosages demonstrated correspondingly higher chlorophyll levels, indicating the potential for light as a limiting factor. Lastly, nutrient levels approached depletion near the end of the six-day experiment. Overall, both light and nutrient availability have the potential to limit primary productivity; however, the extent to which each is important and when is still unclear.